

REMARKS

The Office Action of February 26, 2008, has been received and reviewed. All claims stand rejected. The Application is to be amended as previously set forth. Basis for new claims 22-24 can be found throughout the Specification and more specifically in Example 3. All amendments are made without prejudice or disclaimer. No new matter has been presented. Reconsideration is respectfully requested.

Rejections under 35 U.S.C. § 102(b)

Claim 15 stands rejected under 35 U.S.C. § 102(b) as assertedly being anticipated by Jasinski et al. (Bulletin de la Societe Royale des Sciences de Leige, 68(5-6): 323) in light of Jasinski et al. (The Plant Cell, 13: 1095-1107), and the sequence report appended to the Office Action of February 26, 2008. Applicants respectfully traverse the rejection as hereinafter set forth.

Applicants note that a claim is only anticipated if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). Applicants respectfully assert that claim 15 cannot be anticipated by the cited references, because they do not teach each and every element of claim 15. Specifically, claim 15 recites "a sequence having at least 91% identity to a sequence selected from the group consisting of the polynucleotide sequence of SEQ ID NO:1 and the polypeptide sequence of SEQ ID NO:2". As shown by the following BLAST sequence alignments, the Jasinski sequences have only 89% sequence identity to SEQ ID NOs:1 and 2.

Sequence 1: SEQ ID NO:2

Sequence 2: Jasinski accession aj404328

Score = 2363 bits (6125), Expect = 0.0
Identities = 1292/1439 (89%), Positives = 1360/1439 (94%), Gaps = 17/1439 (1%)

Query	1	MEPSDLSNFRGRSMRGS---VRENSNSIWRNNGVEIFSRSTRDEDEEALKWAAL	56
		MEP+DLSN RGRS+R S+RGS +RENSNSIWRNNG E+FSRS RDEDEEALKWAAL	
Sbjct	1	MEPADLSNLRGRSLRASIRGSMRGSIRENSNSIWRNNGAEVFSRSARDEDEEALKWAAL	60
Query	57	EKLPTYDRLRKGI LFGSQGTGVAEVDVDDLGVQQRKNLLDRLVKIAEEDNEKFLKLNK	116
		EKLPTYDRLRKGI LFGSQG AEVDVDD GV +RKNLL+RLVK+A+EDNEKFLKLNK	
Sbjct	61	EKLPTYDRLRKGI LFGSQGAA-AEVDVDDSGVLERKNLLERLVKVAEDNEKFLKLNK	119
Query	117	IDRVGIDFPSIEVRFEHLNIEADAYVGSRALPTFTNFISNFIESLLDSLHILPSKKRSVT	176

Sbjct	120	IDRVGIDFPSIEVRFEHLNI+ADAYVGSRALPTFTNFISNF+E LLDS+HILPSKKR VT IDRVGIDFPSIEVRFEHLNIDADAYVGSRALPTFTNFISNFVEGLLDSIHILPSKKRQVT	179
Query	177	ILKDVSIGIVKPCRMTLLLGPFGSGKTTLLALAGKLDALRVTKVITYNGHELHEFVPQR ILKDVSIGIVKPCRMTLLLGPFGSGKTTLLALAGKLDAL+VTGKVTYNGHELHEFVPQR	236
Sbjct	180	ILKDVSIGIVKPCRMTLLLGPFGSGKTTLLALAGKLDALRVTKVITYNGHELHEFVPQR	239
Query	237	TAAYISQHDHLHIGEMTVRETLEFSARCQGVGSRYEMLAELSRREKAANIKPDADIDMFMK TAAYISQHDHLHIGEMTVRETLEFSARCQGVGSRYEMLAELSRREKAANIKPDADIDMFMK	296
Sbjct	240	TAAYISQHDHLHIGEMTVRETLEFSARCQGVGSRYEMLAELSRREKAANIKPDADIDMFMK	299
Query	297	AASTEGQEAQVITDYVLKILGLDICADTMVGDQMIIRGISGGQKKRVTTGEMIVGPSKALF AASTEGQEAQV+TDY+LKILGLDICADTMVGDQMIIRGISGGQKKRVTTGEMIVGPSKALF	356
Sbjct	300	AASTEGQEAQVVTDYILKILGLDICADTMVGDQMIIRGISGGQKKRVTTGEMIVGPSKALF	359
Query	357	MDEISTGLDSSTTYSIVNSLKQSVQILKGTALISLLQPAPETYNLFDDIVLLSDGYIVYQ MDEISTGLDSSTTYSIVNSLKQSV+I+KGTALISLLQPAPETYNLFDDI+LLSDGYIVY+	416
Sbjct	360	MDEISTGLDSSTTYSIVNSLKQSVRIMKGTALISLLQPAPETYNLFDDIILLSDGYIVYE	419
Query	417	GPREEVLDFEFESMGFKCPNRKGVADFLQEVTSKKDQQQYVWKRDEPYRFITSKEFAEAYQ GPREEVL+FEFESMGFKCP RKG ADFLQEVTSKKDQQQYV++RDEPYRFITSKEFAEAYQ	476
Sbjct	420	GPREEVLDFEFESMGFKCPEKGAADFLQEVTSKKDQQQYVWIRDEPYRFITSKEFAEAYQ	479
Query	477	SFHVGRKVSDELTTAFDKSKSHPAALTTEKYGIGVKQLLKVCTEREFLMQRNSFVYIFK SFHVGRKVSDEL T FDKSKSHPAALT+KYGIG +QLLKVCTERE LLMQRNSFVY+FK	536
Sbjct	480	SFHVGRKVSDELKTTFDKSKSHPAALT+QKYGIGKRLKLVCTERELLMQRNSFVYLFK	539
Query	537	FFQLMVIALMTMTIFFRTKMSRDTETDGGIYSGALFFTVMLMFNGLSELPLTYKLVPF FFQL++IALMTMTIFFRTKM RD+ DGGIYSGALFF V+M+MFNGLSELP+TYKLVPF	596
Sbjct	540	FFQLLIIALMTMTIFFRTKMPRDSAEDGGIYSGALFFVIMIMFNGLSELPMTLYKLVPF	599
Query	597	YKQRDFLFYPSWAYAVPSWILKIPVTFLEVGMWVFLTYVYVIGFDPNVGRFFKQFLLLIV YKQRDFLFYPSWAYA+PSWILKIPVTF EVGMWVFLTYV+GFDPNVGRFFKQFLL++V	656
Sbjct	600	YKQRDFLFYPSWAYAIPSWILKIPVTFLEVGMWVFLTYVYVIGFDPNVGRFFKQFLLLLLV	659
Query	657	NQMASGLFRFIAAVGRMTMGVASTFGAFALLLQFALGGFVLARTDVKDWWIWGYWTSPLMF NQMAS LFRFIAAVGRMTMGVASTFGAFALLLQFALGGF+LAR DVKDWWIWGYWTSPLM+	716
Sbjct	660	NQMASALFRFIAAVGRMTMGVASTFGAFALLLQFALGGFVLARNDVKDWWIWGYWTSPLMY	719
Query	717	SVNAILVNEFDGKKWKHIAPIANGTEPLGPAVVRSGQFFPDAYWYVIGVGVGFTVLFNIA SVNAILVNEFDG+KKWKH GTEPLG AVVR++GFFPDAYWYVIGVGVG GF V+FNIA	776
Sbjct	720	SVNAILVNEFDGQKKWHIVAGGTEPLGAAVVRARGFFPDAYWYVIGVGVGAGFIVMFNIA	779
Query	777	YSLALAYLNPFQKQATISEESENENSELSTPIASTTEGDSVGENQKKGMLPFPFPHS YS+ALAYLNPF KPQATI + N SE S I ST EGDS EN+ KKGMLPFP+PHS	836
Sbjct	780	YSVALAYLNPFQKQATI-SDESENNESESSPQITSTQEGDSASENK-KKGMLPFPDPHS	837
Query	837	ITFDEVVYSVDMPPPEMREQGTSDNRLVLLKSVSGAFRPGVLTALMGVSGAGKTTLMDVLA ITFDEVVYSVDMPPPEMRE GTSDNRLVLLKSVSGAFRPGVLTALMGVSGAGKTTLMDVLA	896
Sbjct	838	ITFDEVVYSVDMPPPEMRESGTSDNRLVLLKSVSGAFRPGVLTALMGVSGAGKTTLMDVLA	897
Query	897	GRKTGGYIDGSIINISGYPKQETFARISGYCEQNDIHSPYVTVYESLVYSAWLRLPQDQD GRKTGGYIDGSI ISGYPKQ+TFARISGYCEQNDIHSPYVTV+ESLVYSAWLRLPQDV+	956
Sbjct	898	GRKTGGYIDGSIKISGYPKQDTFARISGYCEQNDIHSPYVTVFESLVYSAWLRLPQDVN	957
Query	957	EKKRMMFVEQVMELVELTPLRSALVGLPGVNG-----LTIARELVANPSIIFMDEPT E+KRRMMFVE+VM+LVELTPLRSALVGLPGVNG LTIARELVANPSIIFMDEPT	1008
Sbjct	958	EKKRMMFVEVMDLVELTPLRSALVGLPGVNGLSTEQRKRLTIARELVANPSIIFMDEPT	1017
Query	1009	SGLDARAAAIVMRAVRNTVDTGRTVVCTIHQPSIDIFEAFDELFLMKRGGQEIYVGPGLGR SGLDARAAAIVMRAVRNTVDTGRTVVCTIHQPSIDIFEAFDELFLMKRGGQEIYVGPGLGR	1068
Sbjct	1018	SGLDARAAAIVMRAVRNTVDTGRTVVCTIHQPSIDIFEAFDELFLMKRGGQEIYVGPGLGR	1077
Query	1069	ESSHLIKYFESIPGVTKIKEGYNPATWMLLEVTSQSEITLGVDFTELYKNSDLFRRNKAL +S HLIKYFESIPGV+KI EGYNPATWMLLEV+SSQE+ LGVDFT+LYK SDL+RRNKAL	1128
Sbjct	1078	QSCHLIKYFESIPGVSKIVEGYNPATWMLLEV+TASSQEMALGVDFDLYKKSPLYRRNKAL	1137
Query	1129	IEELSVPRPGTSDLHFETEFSPQFWQCMACLWKQHSYWRNPAYTAVRFLFTTFIALIF I+ELSVPRPGTSDLHF++EFSQPFW QCMACLWKQHSYWRNPAYTAVR +FTTFIALIF	1188
Sbjct	1138	IDELSVPRPGTSDLHFDEFSQPFWTQCMACLWKQHSYWRNPAYTAVRLFTTFIALIF	1197

Query	1189	GSMFWDIGTKVSGPQDLKNAMGSMYAAVLFLGVQNSSSVQPVVSVERTVFYREKAAGMYS	1248
		G+MFWDIGTKVS QDL NAMGSMYAAVLFLGVQNSSSVQPVVSVERTVFYREKAAGMYS	
Sbjct	1198	GTMFWDIGTKVSRNQDLVNAMGSMYAAVLFLGVQNSSSVQPVVSVERTVFYREKAAGMYS	1257
Query	1249	AMPYAFAQVFIEIPYFVQAVVYGLIVYSMIGFEWTAAKFFWYFFFMFFFLYFTFFGMM	1308
		A+PYAFAQV IEIPY+FVQA VYGLIVYSMIGFEWT AKFFW FFFMFFFLYFTFFGMM	
Sbjct	1258	AIPYAFAQVLEIPYIFVQATVYGLIVYSMIGFEWTVAKFFWDFFFMFFFLYFTFFGMM	1317
Query	1309	TVAVTPNQNVASIVAGFFYTVWNLFSGFIVPRPRIPIWRRWYIWACPVAVTLYGLVASQF	1368
		TVAVTPNQNVASIVAGFFYTVWNLFSGFIVPRPRIPIWRRWYIW CP+AWTLYGLVASQF	
Sbjct	1318	TVAVTPNQNVASIVAGFFYTVWNLFSGFIVPRPRIPIWRRWYIWGCPIAWTLYGLVASQF	1377
Query	1369	GDLQDTIND--QTVEDFLRSSYGFKHDFLGVVAAVIVAFVVFATTFALGIKAFNFQRR	1425
		GDLQD + D QTVE FLRS++GFKHDFLGVVAAVIVAFVVFATTFALGIKAFNFQRR	
Sbjct	1378	GDLQDPLTDQNTVEQFLRSNFGFKHDFLGVVAAVIVAFVVFATTFALGIKAFNFQRR	1436

Sequence 1: SEQ ID NO:1

Sequence 2: Jasinski accession aj404328

Score = 3798 bits (1975), Expect = 0.0
Identities = 2618/2932 (89%), Gaps = 9/2932 (0%)
Strand=Plus/Plus

Query	168	AAGTATGAGAGGAAGTATGAGAGGAAGTGAAGGGAAAATAGTAACCTCAATATGGAGGAA	227
Sbjct	124	AAGTATAAGGGGAAGCATGAGAGGAAGTATAAGAGAAAATAGCAATTCAATATGGAGAAA	183
Query	228	CAATGGAGTTGAAATATTTTCAAGATCAACTAGAGATGAAGATGATGAAGAGGCATTAAA	287
Sbjct	184	TAATGGTGCTGAGGTATTTTCGCGTTCAGCGAGGGATGAAGATGATGAAGAAGCACTTAA	243
Query	288	ATGGGCAGCACTTGAGAAATTACCAACATATGATAGATTAAGAAAAGGTATATTGTTTGG	347
Sbjct	244	ATGGGCTGCACTTGAAAAATTACCAACTTATGATAGATTAAGAAAAGGTATATTGTTTGG	303
Query	348	ATCACAAGGTACTGGTGTTGCTGAAGTTGATGTAGATGATCTTGGTGTTCAACAAAGGAA	407
Sbjct	304	ATCACAAGGTGCTGCTG---CTGAAGTTGATGTAGATGATTCAGGTGTTTGAAGAGAAA	360
Query	408	GAATTTGCTTGACAGACTTGTTAAAATTGCTGAAGAAGATAATGAGAAGTTCTTGTTGAA	467
Sbjct	361	GAATTTGCTTGAAAGACTTGTTAAAGTTGCTGATGAAGATAATGAGAAGTTTCTGCTGAA	420
Query	468	ACTCAAGAACAGGATTGACAGGGTTGGGATTGATTTTCCATCTATAGAAGTGAGATTGGA	527
Sbjct	421	ACTCAAGAAATAGAATTGACAGGGTTGGGATTGATTTTCCATCAATAGAGGTGAGATTGGA	480
Query	528	GCATCTGAATATTGAGGCAGATGCATATGTTGGTAGCAGAGCTTTGCCTACATTTACCAA	587
Sbjct	481	GCATCTGAATATTGATGCAGATGCATATGTAGGAAGCAGAGCTTTGCCTACATTTACCAA	540
Query	588	CTTCATTTCTAACTTCATTGAGTCCCTGCTGGATTCACTTCACATCCTTCCATCGAAAAA	647
Sbjct	541	CTTCATTTCTAACTTCGTTGAGGGCCTATTGGATTCAATTCACATACTTCCATCAAAGAA	600
Query	648	ACGTTTCAGTTACAATTCTCAAGGATGTTAGTGGTATCGTCAAGCCCTGTCGAATGACTCT	707
Sbjct	601	AAGGCAAGTTACAATTCTCAAGGATGTTAGTGGCATAGTTAAGCCCTGTAGAATGACTCT	660
Query	708	GCTTTTAGGACCTCCAGGTTCTGGGAAAACAACCTTTGTTACTTGCTTTGGCTGGAAAAC	767
Sbjct	661	TCTTTTGGGACCTCCTGGTTCTGGAAAACACTTTGTTACTTGCTTTGGCTGGTAAAC	720
Query	768	TGATTCTGCTCTAAGGGTTACGGGGAAGGTGACGTATAATGGACACGAATTACATGAATT	827
Sbjct	721	TGACTCTGCTCTAAGGGTTACTGGAAAGGTGACATATAATGGACATGAATTACATGAGTT	780

Query	828	TGTGCCACAAAGAACTGCGGCCTATATTAGCCAGCATGATTTGCATATTGGAGAAATGAC	887
Sbjct	781	TGTGCCACAAAGAACTGCGCCTTATATTAGCCAGCATGATTTGCATATTGGAGAAATGAC	840
Query	888	TGTCAGAGAAACTTTGGAGTTCTCTGCAAGATGCCAAGGAGTTGGTTCTCGTTACGAAAT	947
Sbjct	841	TGTTAGAGAAACTTTGGAGTTCTCTGCAAGATGCCAAGGCGTTGGCTCTCGTTATGAGAT	900
Query	948	GTTGGCCGAACTGTCAAGAAGAGAGAAAGCGGCTAATATCAAACCAGATGCTGATATTGA	1007
Sbjct	901	GCTGGCTGAACTATCAAGAAGAGAGAAAGCAGCTAATATTAAACCAGATGCTGATATTGA	960
Query	1008	CATGTTTCATGAAGGCTGCATCAACTGAAGGGCAAGAAGCCAAAGTGATTACTGATTATGT	1067
Sbjct	961	CATGTTTCATGAAGGCTGCATCAACAGAAGGACAAGAGGCCAAAGTGGTTACAGATTACAT	1020
Query	1068	TCTTAAGATTCTGGGACTGGATATTTGTGCAGATACTATGGTGGGAGATCAAATGATAAG	1127
Sbjct	1021	TCTTAAGATACTGGGACTGGATATTTGTGCAGATACTATGGTGGGAGATCAAATGATAAG	1080
Query	1128	GGGTATTTTCAGGAGGACAGAAGAAGCGTGTCACTACTGGTGAAATGATTGTCTGGACCGTC	1187
Sbjct	1081	GGGTATTTTCAGGAGGACAGAAGAAGCGTGTGACGACTGGTGAAATGATTGTTGGACCGTC	1140
Query	1188	TAAAGCCCTTTTCATGGATGAAATTTCAACTGGACTTGACAGTTCCACAACCTTACTCCAT	1247
Sbjct	1141	TAAAGCACTTTTCATGGATGAAATATCAACTGGATTGGACAGTTCCACTACTTACTCCAT	1200
Query	1248	CGTGAATTCCTTAAAGCAATCTGTTCAAATCTTGAAAGGAACAGCTCTGATTTCTCTCTT	1307
Sbjct	1201	TGTGAATTCCTTAAAGCAATCTGTTCGAATCATGAAGGGAACAGCTCTGATTTCTCTCTT	1260
Query	1308	GCAGCCTGCCCCGAGACTTACAACCTTGTTTCGATGATATTGTTCTGCTATCAGATGGCTA	1367
Sbjct	1261	GCAACCTGCCCCGAGACCTACAACCTGTTTCGACGATATTATTCTGTTATCCGATGGGTA	1320
Query	1368	CATTGTTTATCAGGGTCCACGAGAGGAAGTGCTCGATTTCTTTGAATCCATGGGATTCAA	1427
Sbjct	1321	TATTGTTTATGAGGGTCCGCGAGAGGAAGTGCTCGAGTTCTTTGAATCCATGGGATTCAA	1380
Query	1428	ATGCCCAACAGAAAAGGCGTGGCTGACTTCTTGCAAGAAGTTACATCTAAGAAGGATCA	1487
Sbjct	1381	ATGCCCTGAGAGAAAAGGCGCTGCTGACTTCTTGCAAGAAGTGACATCTAAGAAGGATCA	1440
Query	1488	ACAGCAATATTGGGTAAAGAGGGACGAGCCTTATAGGTTTATTACATCAAAGAATTTGC	1547
Sbjct	1441	ACAGCAATATTGGATTAGGAGAGATGAGCCTTATCGGTTATCACATCAAAGAATTTGC	1500
Query	1548	TGAGGCTTATCAATCTTTCCATGTTGGGAGAAAAGTAAGCGATGAACTTACAACCGCATT	1607
Sbjct	1501	TGAAGCTTATCAGTCTTTTCATGTTGGAAGAAAAGTAAGCGATGAGCTCAAACACATT	1560
Query	1608	TGACAAGAGCAAAAGCCACCCTGCTGCTTTGACTACTGAAAAGTATGGTATTGGAGTGAA	1667
Sbjct	1561	TGACAAGAGTAAAAGCCACCCTGCTGCTTTGACTACTCAAAGTATGGTATAGGGAAGAG	1620
Query	1668	ACAACCTTTGAAGGTTTGACGGAAGAGAGTTCCCTTCTAATGCAGAGGAATTCATTTGT	1727
Sbjct	1621	ACAACCTTTGAAGGTTTGACCGAAAGAGAACTATTGCTAATGCAAAGAACTCATTGT	1680
Query	1728	TTACATCTTCAAATCTTTTCAGCTTATGGTAATTGCACTTATGACAATGACCATATTTTT	1787
Sbjct	1681	TTACCTCTTCAAGTTCTTTTCAGCTCTGATAATCGCACTTATGACAATGACCATATTTTT	1740
Query	1788	TCGAACTAAGATGTCTCGGGATACTGAGACCGATGGAGGAATTTATTCTGGTGCTCTCTT	1847
Sbjct	1741	CCGAACTAAGATGCCTCGGGATAGTGCAGAAGATGGAGGAATATATTCTGGTGCTCTCTT	1800
Query	1848	TTTTACGGTTGTTATGCTTATGTTTAAATGGTTTGTCTGAGCTTCCTTTGACACTCTACAA	1907

[illegible]

Query	2928	CCATTCACCTTATGTAACAGTTTATGAGTCCTTGGTTTACTCGGCTTGGCTGCGTTTACC	2987
Sbjct	2875	CCATTCACCGTATGTAACAGTTTTTGTAGTCATTGGTTTACTCAGCTTGGCTGCGTTTACC	2934
Query	2988	TCAAGACGTTGATGAGAAAAAGCGAATGATGTTTCGTTGAACAAGTTATGGAACTTGTGGA	3047
Sbjct	2935	TCAAGACGTCAATGAAGAAAAAGGATGATGTTTGTGAGGAAGTTATGGATCTTGTGGA	2994
Query	3048	GCTTACACCACTAAGATCTGCCTTAGTCGGGTTGCCAGGAGTTAATGGTCTG	3099
Sbjct	2995	GCTTACACCATTAAAGATCAGCCTTAGTCGGGTTGCCAGGAGTTAACGGTCTG	3046

Score = 1815 bits (944), Expect = 0.0
Identities = 1207/1336 (90%), Gaps = 6/1336 (0%)
Strand=Plus/Plus

Query	3098	TGACGATTGCAGTTGAACTAGTAGCAAACCCCTCTATCATTTTTATGGACGAACCAACTT	3157
Sbjct	3069	TGACGATTGCAGTTGAACTAGTGGCAAATCCCTCTATCATTTTTATGGACGAACCAACTT	3128
Query	3158	CAGGATTGGATGCAAGAGCTGCTGCAATTGTGATGAGAGCTGTTAGGAACACTGTGCGATA	3217
Sbjct	3129	CAGGGTTAGATGCAAGAGCTGCTGCCATTGTGATGAGAGCTGTTAGGAACACTGTGCGATA	3188
Query	3218	CAGGGAGAAGTGTGTTGTGTACCATTTCATCAGCCTAGCATTGACATTTTTGAGGCGTTTCG	3277
Sbjct	3189	CAGGAAGAACAGTTGTTGTACCATTTCATCAGCCTAGCATTGACATTTTTGAGGCTTTTCG	3248
Query	3278	ATGAGTTATTTCTTATGAAACGAGGAGGACAAGAGATATACGTCGGTCCATTAGGTCGTG	3337
Sbjct	3249	ACGAGTTGTTTCTAATGAAACGAGGAGGACAAGAGATATACGTTGGTCCATTAGGCCGCC	3308
Query	3338	AGTCAAGCCATTTGATAAAGTATTTTGTAGTCTATACCCGGTGTAACCAAAATAAAGGAGG	3397
Sbjct	3309	AATCATGCCATTTGATAAAATATTTTGTAGTCGATACCTGGAGTAAGCAAAATAGTGGAAG	3368
Query	3398	GGTACAATCCAGCAACTTGGATGTTAGAAGTCACATCTTCGTCTCAAGAAATAACATTAG	3457
Sbjct	3369	GTTACAATCCAGCAACTTGGATGTTAGAAGTCACAGCCTCATCTCAAGAAATGGCATTAG	3428
Query	3458	GTGTTGATTTTACCGAATTATACAAGAACTCAGACCTCTTCCGGAGGAACAAAGCTTTGA	3517
Sbjct	3429	GGGTTGATTTTACTGACTTGTACAAGAAGTCAGATCTCTACAGGAGAAACAAAGCCTTGA	3488
Query	3518	TCGAGGAACTAAGTGTGCCACGCCCTGGTACAAGTGACCTGCATTTTGAACTGAATTCT	3577
Sbjct	3489	TTGATGAACCTAAGCGTGCCGCGACCTGGTACAAGTGACCTGCATTTTGATTCTGAATTCT	3548
Query	3578	CACAGCCATTTTGGGTCCAATGTATGGCTTGTGTTGTGGAAGCAACACTGGTCATACTGGC	3637
Sbjct	3549	CACAGCCATTTTGGACCAATGTATGGCTTGCCTATGGAACAACACTGGTCATATTGGC	3608
Query	3638	GTAATCCGGCTTATACTGCAGTCAGATTTCTCTTCAACCTTCATAGCTCTCATATTCTG	3697
Sbjct	3609	GTAATCCGGCTTACACTGCAGTCAGACTTATCTTCAACCTTTATAGCACTCATTTTCTG	3668
Query	3698	GGTCAATGTTCTGGGATATTGGTACAAAAGTGAGTGGGCCCCAAGATCTGAAAAACGCCA	3757
Sbjct	3669	GGACAATGTTCTGGGATATTGGTACCAAAGTGAGTAGGAACCAAGATCTGGTTAATGCTA	3728
Query	3758	TGGGATCTATGTATGCTGCTGCTCCTCTTCCCTTGGTGTGAGAATTCATCGTCAGTTCAGC	3817
Sbjct	3729	TGGGATCTATGTATGCTGCTGTTCTCTTCCCTTGGCGTACAAAATTCATCGTCAGTTCAGC	3788
Query	3818	CCGTTGTATCTGTGCAACGTAAGTGTATTTTACAGAGAAAAAGCTGCTGGAATGTACTCCG	3877
Sbjct	3789	CTGTTGTATCCGTTGAGCGTACTGTATTTTACAGAGAAAAAGCTGCTGGAATGTACTCTG	3848
Query	3878	CGATGCCCTATGCCTTTGCACAAGTTTTTCATCGAAATTCCTTATGTATTTGTACAAGCTG	3937

Sbjct	3849	CTATACCATATGCCTTTGCACAAGTTCTCATTGAAATACCTTATATATTTGTTCAAGCTA	3908
Query	3938	TTGTCTATGGTCTCATTGTCTATTCTATGATTGGATTGAATGGACTGCTGCAAAATTCT	3997
Sbjct	3909	CTGTCTATGGTCTCATTGTCTATTCTATGATTGGATTGAATGGACTGTTGCAAAATTCT	3968
Query	3998	TTTGGTACTTCTTCTTCATGTTCTTCACCTTCCTCTACTTCACCTTCTTTGGCATGATGA	4057
Sbjct	3969	TTTGGGACTTCTTCTTCATGTTCTTCACCTTCCTGTACTTCACCTTCTTTGGTATGATGA	4028
Query	4058	CCGTGGCTGTTACCCCGAACCAAAATGTTGCTTCAATCGTTGCCGGATTCTTCTATACAG	4117
Sbjct	4029	CCGTGGCTGTGACCCCGAATCAAAACGTTGCTTCAATCGTCGCTGGATTCTTCTATACAG	4088
Query	4118	TATGGAATCTCTTCTCAGGATTCATCGTTCCACGACCTCGTATTCCGATATGGTGGAGAT	4177
Sbjct	4089	TATGGAATCTCTTCTCAGGTTTCATCGTTCCACGACCTCGTATTCCGATATGGTGGAGAT	4148
Query	4178	GGTACTACTGGGCTTGCCCTGTTGCATGGACATTGTATGGTTTGGTTGCATCTCAATTTG	4237
Sbjct	4149	GGTACTACTGGGGTTGCCCTATTGCATGGACCTTGATGGTTTGGTTGCATCTCAATTCG	4208
Query	4238	GAGACCTCCAAGATACAATTAATG-----ATCAAAGTGTGGAAGATTCTTGAGAAGTA	4291
Sbjct	4209	GAGACCTTCAAGATCCACTTACTGATCAGAATCAAAGTGTGGAACAATTCCTGAGAAGTA	4268
Query	4292	GCTATGGATTTAAGCATGATTTTCTAGGAGTTGTTGCAGCTGTGATCGTTGCATTTGCAG	4351
Sbjct	4269	ACTTTGGATTTAAGCATGATTTTCTTGGAGTTGTTGCAGCTGTGATCGTTGCGTTTGCTG	4328
Query	4352	TTGTTTTCGCCTTCACATTTGCTTTGGGTATCAAGGCATTCAATTTCCAGAGAAGATAGA	4411
Sbjct	4329	TTGTTTTCGCCTTCACATTTGCTTTGGGTATTAAGGCATTCAACTTCCAGAGAAGATAAA	4388
Query	4412	AATAGTATTTATTTGT	4427
Sbjct	4389	AAGAGTGTCTATTTGT	4404

The Office did not indicate, in the Office Action of February 26, 2008, the method used to find that NpABC1 has “at least 91% sequence identity to SEQ ID NO:2” (Office Action of February 26, 2008, p. 3). Applicants note that BLAST sequence alignment was specifically described in the Specification as a method for calculating sequence identity. (Id., at ¶ [0050]). Consequently, applicants respectfully submit that none of the references teach “an isolated polynucleotide sequence comprising a sequence having at least 91% identity to a sequence selected from the group consisting of the polynucleotide sequence of SEQ ID NO:1 and the polypeptide sequence of SEQ ID NO:2,” and respectfully request the rejection of claim 15 under 35 U.S.C. § 102(b) be withdrawn. It is believed claim 15 is in condition for allowance.

Rejections under 35 U.S.C. § 103(a)

Claims 1-13 and 15-19 stand rejected under 35 U.S.C. § 103(a) as assertedly being

unpatentable over Muhitch *et al.* (Plant Science, 157: 201-207; claims 1, 3, 10-13, and 16-19); Rea *et al.* (WO 98/21938; claims 1-13, and 15-19); and Theodoulou (Biochemica et Biophysica Acta, 1465: 79-103) in view of Dudler *et al.* (J. Biol. Chem., 267(9): 5582-5588) in further view of Sidler *et al.* (The Plant Cell, 10:1623-1636; claims 1-13, and 15-19). Applicants respectfully traverse the rejections.

Claims 1, 3, 10-13, and 16-19 stand rejected under 35 U.S.C. § 103(a) as assertedly being unpatentable over Muhitch *et al.* Muhitch describes the use of an ABC transporter to reduce or eliminate the cytotoxic effects of DAS, a trichothecene product of several fungal genera. The Office Action stated in support of the 35 U.S.C. § 103(a) rejection in view of Muhitch that “claims (1, 3, 10-13, and 16-19) are broadly drawn to processes of enhancing *secretion* of an unspecified secondary metabolite...” (emphasis added). The Office has asserted that it would have been obvious for one of ordinary skill in the art to characterize the *in planta* transport activity of the ABC transporter transgene, to transform tobacco with the transgene, and to select mycoresistant plants and plant cells.

Prior to the currently presented amendments, claims 1, 3, 10-13, and 16-19 recited the element of plant cells and plant cell cultures with enhanced “production or secretion” of secondary metabolites. Applicants respectfully note that the 35 U.S.C. § 103(a) rejection of these claims in light of Muhitch does not establish why it would have been obvious for one of ordinary skill in the art to enhance production of a secondary metabolite through expression of an ABC transporter. Claims 1, 3, 10-13, and 16-19 are amended herein to recite “production” without mention of secretion. For the reasons that follow, Muhitch strongly teaches away from claims 1, 3, 10-13, and 16-19, as amended, to recite production without mention of secretion.

A reference must be considered not only for what it expressly teaches, but also for what it fairly suggests. *In re Baird*, 16 F.3d 380 (Fed. Cir. 1994). The inherent teaching of a prior art reference arises in the obviousness setting as well as under 35 U.S.C. § 102. *In re Grasselli*, 713 F.2d 731 (Fed. Cir. 1983). A reference may be said to teach away when a person of ordinary skill, upon reading it, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path taken by the inventor. *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877 (Fed. Cir. 1998); *Para-Ordnance Mfg. v. SGS*

Importers Int'l Inc., 73 F.3d 1085 (Fed. Cir. 1995); *In re Gurley*, 27 F.3d 551 (Fed. Cir. 1994).

Muhitch teaches that increased expression of ABC transporters in a cell is correlated with decreased concentrations of substrate toxins in the cytosol of the expressing cell. Therefore, Muhitch teaches away from employing expression of an ABC transporter as a means of increasing the production of a substrate metabolite. In Muhitch, the state of the art with respect to the transport of secondary metabolites is described. For example, in the first paragraph of page 1, it is stated that “[m]ycotoxin-producing fungi have developed strategies to protect themselves from their own toxins... (one) protection strategy is to transport toxins out of the cell via membrane transporter pumps.” Furthermore, it is explained in the second paragraph of the Discussion section that “(Muhitch *et al.*) have taken the approach that a reduction in the intracellular levels of toxin should diminish pathogen ingress by removing or decreasing the amounts of fungal virulence factors.” In general, Muhitch relies upon, and reinforces, the idea that expression of ABC transporters will lead to a decrease in the intracellular amount of toxic secondary metabolite substrates of those transporters. Muhitch *et al.* expressly attributes the increase in DAS resistance they observed to “toxin export.” It is inherently contradictory that expression of an ABC transporter would confer toxin resistance by increasing toxin export, yet also increase production of the toxin. Increased production of a given toxin would serve to act antagonistically to export of the toxin, and would mask the desired phenotype. This characterization of the state of the art with respect to the transport of secondary metabolites is reinforced by Rea *et al.* (“Animal and plant cells have the capacity to eliminate a diversity of lipophilic toxins from the cytosol following conjugation of the toxin with glutathione. This process is mediated by glutathione S-conjugate (GS-X) pumps which are novel MgATP-dependent transporters that catalyze the efflux of GS-conjugates and glutathione disulfide (GSSG) from the cytosol via the plasma membrane and/or endomembranes.” WO 98/21938, at page 1, lines 12-20). Rea has been cited by the Office as representative of the state of that art. (See e.g. Rea, Office Action of February 26, 2008, page 9, lines 8-9 and 22-23).

In summary, the state of the art at the time the pending application was filed was that ABC transporters were a poorly understood system thought to have the general cellular purpose of eliminating cytotoxic compounds from the cytosol. The relevant question with respect to the nonobviousness of claims 1, 3, 10-13, and 16-19, as amended, is whether one skilled in the art

who was attempting to solve the problem of increasing, stimulating, or enhancing production of a secondary metabolite would be led by the teachings of Muhitch, or any combination of the cited prior art references, to find the subject matter of the claims obvious. The teaching that ABC transporters function to eliminate their substrates teaches away from expressing a member of the ABC transporter family for the purpose of increasing production of its substrates. Therefore, claims 1, 3, 10-13, and 16-19 were not obvious.

Claims 1-13 and 15-19 stand rejected under 35 U.S.C. § 103(a) as assertedly being unpatentable over Rea *et al.* Rea describes the transport of secondary metabolites by an ABC transporter into vacuoles. The Office Action of February 26, 2008, states that “[o]ne of ordinary skill would have been motivated by the teachings of Rea that both alkaloid and a pigment could be targeted to a plant vacuole for increased transport using a plant GS-X ABC transporter, [and] would have a reasonable expectation of success in screening for increases in either secretion or production into the vacuole of either anthocyanin or medicarpin...”. Applicants respectfully disagree with this analysis.

Rea does not teach enhanced production of a secondary metabolite resulting from expression of an ABC transporter. Applicants do not understand what was meant by “production into the vacuole.” As the term is defined in paragraph [0043] of the Specification, “to enhance the production” means that the level of a given metabolite in a transformed plant is enhanced by at least 20% relative to the level in the untransformed plant. This interpretation is consistent with the common usage of the term “production” in the art. Further in paragraph [0043], it is recited that “[a]n enhanced production of a secondary metabolite can result in a detection of a higher level of secondary metabolites in the plant, for example in the vacuole.” This statement does not give “production” a contrary meaning to its common usage or its definition in the Specification. For example, a plant exhibiting enhanced production of a secondary metabolite may also exhibit a higher level of that metabolite in the vacuole. It is not true, however, that simply because a transformed plant exhibits a higher level of a secondary metabolite in vacuoles, that the plant exhibits enhanced production of that metabolite.

Rea teaches away from claims 1-13 and 15-19 for the same reasons the Muhitch reference teaches away from claim 1. As discussed *supra*, it is consistent with the common understanding

of the function of ABC transporters in eliminating toxic substrates that there would be no enhanced production. One way the ABC transport system may have been thought to have functioned at the time the present application was filed is that expression of ABC transporters would result in translocation of substrate molecules from the cytosol to the vacuole without any net increase in substrate that would mitigate the protective role of the ABC transport system.

Claims 1-13 and 15-19 stand rejected under 35 U.S.C. § 103(a) as assertedly being unpatentable over Theodoulou in view of Dudler *et al.* in further view of Sidler *et al.* (The Plant Cell, 10:1623-1636). The Office Action of February 26, 2008, states that “[t]he claims are broadly drawn to processes of enhancing secretion of an unspecified secondary metabolite”. Applicants respectfully disagree with this characterization. Prior to the current amendments to the claims, rejected independent claims 1, 10, 12, 16 and 19 recited “*production* or secretion,” and rejected independent claim 7 recited “stimulating the *production*.” Furthermore, in the Requirement for Restriction of May 8, 2006, the Office recognized the elected Group 1 as being “drawn to methods of inducing or enhancing production or secretion of a secondary metabolite.” *Id.*, at 2. Applicants have reviewed the record, and believe the current amendments and new claims completely respond to the Office’s arguments in support of a rejection under 35 U.S.C. § 103(a) in view of Theodoulou, Dudler *et al.*, and Sidler *et al.*

The Theodoulou, Dudler *et al.*, and Sidler *et al.* references do not support the idea that increasing expression of an ABC transporter would result in enhanced production of any secondary metabolite. Furthermore, neither is there any support for the idea in the Muhitch or Rea references. Under a fair reading of these references, they teach only that ABC transporters are involved in the transport of secondary metabolites in plants. The teaching of Theodoulou was described in the Office Action as, “Theodoulou teaches ABC transporter genes from plants that have strong similarity to MDR proteins from other species and suggests a role of the plant homologues in the secretion or sequestering of *vinca* alkaloid and the alkaloid taxol and suggests a strategy for screening transformed plants and plant cells for determining the specific transport function.” *Id.*, at 6. While applicants would give a much narrower meaning to the teaching of the Theodoulou reference, due to the equivocal language used by the author to describe the function of ABC transporters in plants, and the difficulties in determining the function of those

transporters he recites (these arguments have already been presented in the Amendments of November 13, 2006; May 16, 2007; and September 28, 2007), even under the Office's broad interpretation, Theodoulou does not suggest that expression of ABC transporters increases or enhances production of secondary metabolites. Neither do the Dudler and Sidler references provide that suggestion.

In fact, Sidler *et al.* specifically refers separately to the transport of the unknown hypocotyl length-increasing compound, which they hypothesize is regulated by an ABC transporter, and the production of that compound. As the authors state in the portion of their discussion entitled, "How May AtPGP1 Affect Hypocotyl Length?":

An attractive hypothesis is that the AtPGP1 protein is involved in the transport of such a signal. A conceivable function of AtPGP1 would therefore be the export of a hormone-like compound from the shoot apical region that would regulate hypocotyl cell length. The production of this compound would be under the control of the light fluence rate perceived by the cotyledons and possibly other, yet unknown factors, whereas its export would be mediated by the constitutive AtPGP1 exporter. Sidler *et al.*, at 1631.

This passage unarguably shows that Sidler *et al.* does not suggest the ABC transporter described by their work is involved in the production a secondary metabolite.

The Dudler *et al.* reference provides further direction to one of skill in the art that plant ABC transporters are involved in transport, as opposed to production. With respect to members of the ABC transporter family, in general, Dudler *et al.* hypothesize, "it seems likely that they are all involved in some transport process." Dudler, *et al.*, at 5888. Of mammalian P-glycoproteins, they state, "[t]he normal function of these proteins is not known, but it has been hypothesized that it may be the elimination of toxic metabolic or xenobiotic substances." *Id.*, at 5888. Finally, Dudler *et al.* can only conclude from their research that plant ABC transporters are likely to also be involved in transport processes. "[T]he fact that the *Arabidopsis* protein exhibits the highest sequence similarity to the mammalian P-glycoproteins may suggest that functional aspects are also conserved. Thus, the *atpgp1* gene product may be involved in the extrusion of toxic metabolic and xenobiotic compounds from cells." *Id.*, at 5888.

For the foregoing reasons, applicants respectfully assert that there is no express or

inherent suggestion in the art of record that it would have been obvious to one of skill in the art at the time the application was filed to overexpress ABC transporters in plants to increase or enhance the production of a secondary metabolite. Moreover, the state of the art at the time of filing taught away from the use of ABC transporters to increase production of secondary metabolites, as the primary role of those transporters *in planta* was recognized as the elimination of toxic substances from the cytosol of vulnerable cells. For at least these reasons, applicants believe claims 1-13 and 15-19 are nonobvious, and are in condition for allowance. Applicants respectfully request the rejections of these claims be withdrawn.

If questions remain after consideration of the foregoing, the Office is kindly requested to contact applicants' attorney at the address or telephone number given herein.

Respectfully submitted,



Daniel J. Morath, Ph.D.
Registration No. 55,896
Attorney for Applicants
TRASKBRITT, P.C.
P.O. Box 2550
Salt Lake City, Utah 84110-2550
Telephone: 801-532-1922

Date: June 11, 2008
DJM/ats

Enclosure: Petition for Extension of Time